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71 Applicant: BEWATOR AB
Malmgardsvägen 63
S-116 38 Stockholm(SE)

72 Inventor: Bäck, Rune
Solstensvägen 7
S-135 49 Tyresö(SE)

74 Representative: Lindblom, Erik J.
Skördevägen 88
S-122 35 Enskede(SE)

54 A method for establishing whether or not a first person shall be granted free passage to a confined area through a door, gate or the like entrance.

57 The invention relates to a method for establishing whether or not a first person who has identified himself for entrance to a confined space or area with the aid of a magnetic card inserted in a card reader (7) shall be granted free passage to the confined area through a door, gate or like entrance. The card reader (7) evaluates a code significant to the magnetic card and, through the intermediary of electric and/or electronic circuits compares the code with a plurality of pre-stored codes (12) and causes a signal to be generated for deactivating a circuit (2) for latching the door, gate or like entrance when, and only when, acceptable agreement is found between the sensed magnetic card code and the pre-stored codes, to therewith afford free passage to said person. The method is mainly characterized in that:

a) A second person responsible for monitoring the persons desiring entrance to the confined space or area activates (6) means (16) incorporated in the electric and/or electronic circuit so that a code significant of a magnetic card subsequently sensed in the card reader (7) can be stored among a number of pre-stored codes (12);

b) The second person identifies the first person and establishes the validity of a magnetic card in the possession of the first person, the magnetic card being intended for other main purposes than that of obtaining entrance to the confined space or area;

c) The magnetic card belonging to the first person is inserted into the card reader (7) which senses the code significant to the card;

d) The significant code is therewith stored as an additional code among pre-stored codes (12), and in that

e) a subsequent sensing of the magnetic card in the card reader (7) affords free access to the confined space or area.

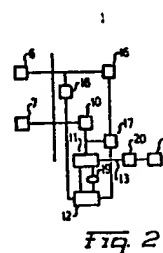


FIG. 2

TITLE OF INVENTION: A method for establishing whether or not a first person shall be granted free passage to a confined area through a door, gate or like entrance.

TECHNICAL FIELD.

The present invention relates to a method for establishing whether or not a first person who has identified himself for entrance to a confined area with the aid of a magnetic card inserted in a card reader shall be granted free passage to said confined area through a door, gate or like entrance.

The present invention is based on the understanding that the card reader is capable of identifying a code or a numerical sequence significant to the magnetic card concerned, and that the code is compared with a plurality of pre-stored codes through the agency of electric and/or electronic circuits intended herefor.

When, and only when, the code on the card agrees with one or more of the pre-stored codes, there is generated a signal which deactivates a locking circuit on the door, gate or like entrance, thereby to permit the person concerned to pass therethrough into the confined area.

It will be noted that for the sake of simplicity reference is made in the following description to the use of a magnetic card, i.e. a card which has a significant code magnetized thereon. It will be understood, however, that the significant code can be embodied in the card in ways other than magnetic.

It is also assumed in the following description that the door through which entrance is gained to said area is normally locked and that the door locking mechanism must be deactivated in order to gain free entrance to said area.

It will be understood, however, that it also lies within the scope of the present invention to use a locking or latching device which occupies a locking or latching mode when in its non-activated state and which must therefore be activated in order to permit said free entrance.

TECHNICAL FIELD

Several methods and arrangements for establishing whether or not a first person shall be permitted free passage to a confined area or space are known to the art.

Various methods and arrangements are also known to the art for activating doors, gates and like entrances to confined areas or spaces, such as to permit free passage thereto subsequent to passing an identification control.

For example, there is known to the art an arrangement in which a door can be latched and unlatched with the aid of an electrically operable latch mechanism which is manipulated with the aid of a striking plate. Electric current is normally supplied to the striking plate through a two-wire cable or twin lead, in response to activation of a push button, which closes a switch in the electric circuit.

It is also known to replace the aforesaid push button and associated switch means with a button bank which is

connected to a central processing unit by means of which a person requiring to enter a confined area through a door served by the locking or latching system can identify himself as being an authorized person who is entitled to enter said area. The button bank co-acts with a code generating device which, in turn, co-acts with a central processing unit, the arrangement being such that the insertion into the button bank of a specific code common to all authorized users and/or a particular significant code allotted to a particular person results in the activation of circuits incorporated in the central processing unit so as to produce therein a signal for activating or deactivating a door latching circuit when the code inserted is accepted.

Various arrangements in card readers are known for evaluating a code significant for the card concerned or a numerical sequence or combination significant thereto, and for comparing the code presented with a plurality of pre-stored codes through the agency of electric and/or electronic circuits, in which the pre-stored codes are embodied.

It is also known that such arrangements will only produce a signal for activating or deactivating a door latching circuit when the code presented thereto coincides with one of the codes stored therein.

A card reader which co-acts with a central processing unit of the aforesaid kind can be said to be known from European Patent Application No 84114432.2, Publication Number 0 146 812.

Arrangements are also known to the art which permit free

passage through a door or like entrance with the aid of a card reader and magnetic card, and in which a single magnetic card is intended to permit access to solely a single, specific confined area or space.

TECHNICAL PROBLEMS

When considering the prior state of this technical field, and that which has been outlined above, it will be perceived that a technical problem prevailing at present in this field is one of creating, with the aid of simple means, conditions whereby a person need not be in possession of a respective particular magnetic card in order to gain entrance to a respective specific restricted area, and therefore require a plurality of specific magnetic cards corresponding to the number of specific area or rooms to which access is desired.

Consequently, a pronounced technical problem in this regard is one of creating, with the aid of simple means, conditions which will enable access to be had to one or more confined areas or rooms with the use of one and the same magnetic card.

A more qualified technical problem in this regard is one of creating, with the aid of simple means, conditions which enable the magnetic card used to comprise a card which is also intended for purposes other than for gaining access to a confined space.

A further technical problem in conjunction herewith resides in the provision of simple means which with regard to identification of the person desiring access to the confined space or area, will afford a greater

degree of security than that normally afforded by a code lock system having identification codes programmed therein.

A more pronounced technical problem with regard to high security levels, or if desired higher security levels, resides in the provision of conditions which enable access to be obtained to a confined space or area with the aid of a conventional credit card, bankers card, cashpoint card, petrol or gasoline credit card, or like card.

Another technical problem is one of providing conditions which enable the apparatus and devices required for high security level identification to be readily installed.

Still a further technical problem in the present regard is one of creating, with the aid of simple means, conditions which will enable a large number of individual codes to be stored, in practice scarcely in excess of five hundred codes, corresponding to the number of persons to which access to a confined space can be permitted subsequent to identification, thereby to render the system sufficiently flexible.

Another technical problem resides in the provision of conditions which enable the complex codes which refer to a large number of mutually different magnetic cards and such cards as those which present a visible, embossed code to be used directly and to be stored in the system in their entirety, or in all events to a sufficiently large extent, without detracting from the demand for a high level of security.

A further technical problem resides in the provision of conditions which enable a code significant to the person concerned to be inserted readily into the system with the aid of a magnetic card intended for purposes other than that of providing access to a confined space or area, subsequent to the system being coded for programming by a person who is responsible for monitoring the persons, and their magnetic cards, desiring entry to the confined space or area.

For the purpose of further enhancing the security level of such a system it is proposed in accordance with the invention that each person who is given possession of a magnetic card of the aforesaid kind, in which a code is stored and which is programmed in the manner aforescribed, is also given an individual code which can be committed to memory, such that the individual code, which shall apply simultaneously and in combination with the code incorporated in the card, is also stored in the central processing unit at the time of entering the code on the card into the memory of said unit.

Another qualified technical problem is one of creating, with the aid of simple means, conditions by means of which the individual code can be formed, said code preferably being in relation to the code found on the magnetic card.

It also lies within the scope of the invention to provide ways and means which will enable entrance to a confined space to be denied to a person who has previously had free access to said space with the aid of a personal magnetic card and, when required, also with the aid of an individual code, and therewith remove the person's

right-to-access from the system.

In conjunction herewith, a further qualified technical problem is one of perceiving that a code which is intended to inhibit or block codes stored in the system should contain or consist of a conversion factor used to form the personal code.

When a lower security level can be accepted, a further technical problem resides in the provision of simple means which, in the absence of a magnetic card, will enable access to be gained to a confined space by simply inserting into a button bank an individual code valid for respective cards.

It will also be seen that a further technical problem resides in creating, with simple means, conditions which require the application of at least two different security levels in order to obtain access to a confined space or area, and in conjunction herewith to create conditions which enable the times at which respective safety levels shall apply to be established or determined with the aid of an external change-over clock.

SOLUTION

For the purpose of solving the aforesaid problems there is proposed in accordance with the present invention a method for establishing whether or not a person who has identified himself as being entitled to access to a confined space or area by inserting a magnetic card into a card reader shall be permitted free passage to said area or space through a door, gate or like entrance.

To this end there is used in accordance with the invention

a card reader which is arranged to evaluate a code significant to the magnetic card and to compare said code with one or more codes present among a multiplicity of pre-stored codes, with the aid of electric and/or electronic circuits intended herefor.

The invention is based on the qualification that a signal for activating or deactivating a circuit for latching or locking the door, gate or like entrance will be generated only when the code incorporated in the magnetic card presented by the person concerned coincides with one or more of said pre-stored codes, therewith affording free passage to said person.

It is a fundamental requirement of the method according to the present invention that a second person, responsible for monitoring the persons, preferably all persons, desiring access to the confined space, actuates means provided in the electric and/or electronic circuit for enabling the significant code incorporated in the magnetic card to be stored among pre-stored codes, subsequent to the card being read in the card reader.

It is also proposed in accordance with the invention that this second person then confirms the identity of the first person and a magnetic card belonging to said first person and intended for principal purposes other than obtaining access to the confined space.

Upon insertion of the magnet card belonging to the first person into a card reader, the card reader senses the significant code on the card in question.

This arrangement enables the whole of the significant

code on the magnetic card held by the first person to be stored as an additional code among the codes previously stored in the memory core.

As a result hereof, subsequent sensing in the card reader of the code on the magnetic card concerned, in the possession of the first person, will provide free entry to the confined space or area, since agreement will be found between the sensed code and a code present amongst the previously stored codes, namely the code last stored.

For the purpose of further enhancing the level of security, it is proposed that in order to obtain free access to the confined space or area it is necessary for the person desiring entry to insert with the aid of a button bank intended herefor, a personal identification code, in addition to requiring the code on the magnetic card sensed in the card reader to coincide with a stored code.

It is also proposed in accordance with the invention that when desiring to activate the aforesaid means in said circuit for storing therein the latest code sensed by the card reader, the aforesaid second person inserts into the circuits, through the intermediary of a button bank, a code significant for writing codes into the system.

It is also possible within the scope of the invention to switch in a change-over clock which is used to determine or establish the respective time periods over which a lower level of security and a high level of security shall prevail.

It is also proposed in accordance with the invention that

the signal for activating or deactivating the circuit for latching or locking the door, gate or like entrance is made active solely for a limited time duration, e.g. a time duration between one and thirty seconds.

It also lies within the scope of the invention to form the memorizable personal code (the identification code) by adding a conversion number or conversion factor to a group of numbers in a numerical series significant to the magnetic card and the code incorporated therein. This conversion number or factor may be, to advantage, the whole of, or part of, an inhibition code.

ADVANTAGES

The advantages afforded by a method according to the present invention reside in the possibilities of enabling a person desiring entry to a confined space or area to provide the requisite proof of his identification, authorizing his entry into said space or area, with the aid of a magnetic card which is intended for purposes other than that of attaining access to the confined space or area, so that a magnetic card previously issued to the person in question can be assigned and obtains a use additional to that for which it was initially intended.

The main characteristic features of a method according to the present invention are set forth in the characterizing clause of the following claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment at present preferred and illustrative of the significant features of the method according to the present invention will now be described in more detail with reference to the accompanying drawing, in which

Figure 1 is a perspective view of a door and code lock installation having a circuit means in accordance with the present invention;

Figure 2 is a block schematic of a code lock which functions in accordance with the method according to the present invention; and

Figure 3 illustrates, in greater detail, the lay-out of an electric circuit significant of the invention.

DESCRIPTION OF AN EMBODIMENT AT PRESENT PREFERRED

In Figure 1 there is illustrated a door 1 which can be locked and opened with the aid of lock 3, which is electrically operable by means of a striking plate 2. Electric current can be supplied to the striking plate through a two-wire cable or lead 4, the wires 4a and 4b of which are connected to a current supply source not shown.

In the vicinity of reference numeral 5 there is located a button bank 6, which is connected to the cable 4 by means of two wires. The button bank 6 incorporates a conventional code generating device, which generates a code corresponding to a predetermined number of selected symbols (digits). This code is transmitted to a central processing unit, in which the code is processed in a conventional manner. If the code received by the central

processing unit is found to be valid, the unit produces a high power carrier signal which is transmitted over the cable 4, to activate the striking plate 2 of the door 1.

The button bank 6 and a central processing unit having the requisite number of storage facilities are combined to form a single assembly, as described in more detail hereinafter.

The card reader may be mounted, to advantage, on the outer casing of the button bank 6.

In addition to the button bank 6 incorporating the central processing unit and the memories associated therewith, there is provided a card reader 7 which is arranged to cooperate with the button bank and said central processing unit.

The present invention affords the possibility of establishing whether or not a first person who has identified himself as being a person entitled to enter a confined space or area (behind the door 1), by inserting a personal magnetic card into a card reader 7, shall be granted free passage to said confined space through the door 1.

Figure 2 illustrates diagrammatically the manner in which the method according to the invention is carried into effect.

It is proposed herewith that the card reader 7 is constructed to evaluate, in a known manner, a code significant to the magnetic card in question, which code may

also comprise a digital sequence or some other discernible characteristic peculiar to said card. The codes sensed by the card reader 7 are transmitted, via electric and/or electronic circuits, to a card receiver 10, and are compared in a comparator 11 with an assortment of codes pre-stored in a storage memory 12.

When, and only when, acceptable agreement is found between the aforesaid generated code and one or more of the aforesaid pre-stored codes conditions are established for the transmission of a signal on line 13, for activating a release circuit or deactivating a latching circuit 2 for the door, gate or like entrance, so as to afford said person free passage to the confined space or area through the door 1.

To this end it is proposed in accordance with the invention that a second person, namely a person responsible for monitoring the persons requiring entry to the confined space or area, activates, through the button bank 6, means 16 which are incorporated in the electric and/or electronic circuit 15 and which activate a circuit 17 so as to enable the significant code of a magnetic card subsequently sensed in the reader to be stored in the aforesaid memory via the circuit 17, among the pre-stored codes in the memory 12.

The invention is based on the assumption that the second person visibly identifies the first person and makes certain that the magnetic card possessed by the first person and intended for major purposes other than obtaining entry to a confined space or area really belongs to said first person and carries an identifiable code which can be sensed in the card reader.

Subsequent to the second person establishing the identity of the first person in the aforesaid manner, the magnetic card belonging to the first person is inserted into the card reader 7, which senses the significant code on the card and stores the code in the memory 12, through the circuits 10 and 17.

The significant code is therewith stored as an additional code among the pre-stored codes in the memory 12, so that subsequent sensing of the magnetic card concerned in the card reader 7 affords free entry to the confined space or area, subsequent to being compared in the comparator 11 and activation of the striking plate 2.

The invention also enables a higher security level to be achieved with the aid of simple means, by requiring the person desiring entry to the confined space or area to insert into the circuits, through the button bank 6, a personal identification code memorized by the person concerned, in addition to presenting to the card reader a magnetic card having incorporated therein a code which coincides with one or more of the codes stored in the memory, before granting said person free access to the confined space or area.

This personal code is detected in a circuit 18, which is connected to the memory 12.

In this case, the striking plate 2 is not activated until it has been established that the code on the magnetic card coincides with one or more of the pre-stored codes, and that the identification code inserted into the circuits coincides with a corresponding identification code stored in the memory 12.

Data as to which code and codes can be expected is found stored in the circuits 12. The identification code for storage in the memory 12 can be inserted in substantially the same manner as the code found on the magnetic card.

In accordance with the invention a change-over clock 19 is provided for establishing the periods of time over which a lower security level can be accepted, during which period all that is required to obtain access is the magnetic card, and those time periods over which a higher security level is required, i.e. a security level in which both magnetic card and the aforesaid identification code must be used and found valid before entry is granted.

In accordance with the present invention, the signal for deactivating the latching circuit 2 for the door, gate or like entrance is caused to occur, via a circuit 20, over a limited time duration, for example a time duration between one and thirty seconds, depending upon the location of the card reader and the orientation of the door, gate or like entrance, thereby preventing unauthorized persons from passing into the confined space or area without permission from the person activating the circuits for entrance to said confined space.

Figure 3 illustrates in more detail a circuit diagram over the arrangement illustrated in Figure 2.

Thus Figure 3 illustrates an electric circuit diagram of a button bank 6 and a central processing unit with the requisite memories incorporated in the button bank.

In Figure 3 the button bank is referenced 6 and the connections to a card reader 7 are referenced 7a.

The reference 21 illustrates an electric contact incorporated in the processing unit for programming the code applicable for inserting and storing codes belonging to magnetic cards. This code shall be memorized by the aforementioned second person.

The reference 27 illustrates an electric contact incorporated in the processing unit for inhibiting one or more stored codes corresponding to mutually different magnetic cards. This code shall also be memorized by the aforesaid second person, although the secrecy requirement is less stringent in this case. Figure 3 also shows the manner in which a processor 23 is connected up, this processor being connected to a memory address register 24, a programme memory 25 and a data memory 26. The reference 27 identifies a decoder and reference 28 identifies an automatic re-start circuit.

The reference 29 identifies the conductor or wire connected to the clock 19, a signal on this conductor indicating a security level in which a correct code entered via the code reader is sufficient to obtain free access.

The method according to the invention can be illustrated by the following examples.

The electric contact 21 is activated and a six digit code is inserted via the button bank 6. This code may be 11 22 33.

The code which enables a code incorporated on a magnetic card and capable of being sensed in the card reader 7 is now read in.

The electric contact 22 is activated and a six digit code is inserted via the button bank 6. This code may be 44 55 66.

The code for inhibiting a code incorporated on a magnetic card and capable of being sensed in the card reader 7 is now read in.

When the second person has assured himself of the identity of the first person and has established that the magnetic card presented truly belongs to said first person, the code

11 22 33

is inserted through the button bank, whereafter the magnetic card is sensed in the card reader 7.

The code significant of this magnetic card is now stored in the data memory 26, this code comprising the whole sequency of digits presented on the magnetic card, for example

5740 0024 0027 7190.

In this code four digits shall be utilized for the purpose of forming a personal code, together with a conversion factor.

Although the digits "0027" have been used in the illustrative example it will be understood that any four digits whatsoever can be used.

The personal code may be formed, for example, by adding

the aforesaid four selected digits to the last four digits in the inhibition code.

Thus, the personal code may be formed as follows

$$\begin{array}{rcl} & 0027 & \text{(four digits in the magnetic card code)} \\ + & 5566 & \text{(last four digits in the inhibition code)} \\ \hline & 5593 & \text{(personal code)} \end{array}$$

The personal code need not be inserted via the button bank 6, but can be calculated in the processor of the central unit and stored in the data memory 26.

In order to simplify memorization of the personal code for the first person, the first person can be informed of which digits in the magnetic-card code, when this code is visible constitute the digits applicable to the personal code, while selecting a simple inhibition code at the same time, for example "00 00 01", the personal code comprising an addition of these number.

It will be understood that the invention is not restricted to the exemplifying embodiment, and that modifications can be made within the scope of the invention defined in the following claims.

CLAIMS

1. A method for establishing whether or not a first person who has identified himself for entrance to a confined space or area with the aid of a magnetic card inserted in a card reader shall be granted free passage to said confined area through a door, gate or like entrance, said card reader evaluating a code significant to the magnetic card and, via electric and/or electronic circuits comparing said code with a plurality of pre-stored codes, and causing a signal to be generated for deactivating a circuit for latching the door, gate or like entrance when, and only when, acceptable agreement is found between the sensed magnetic card code and the prestored codes, to thereby afford free passage to said person, characterized in that,

- a) a second person responsible for monitoring the persons desiring entrance to the confined space or area activates means incorporated in the electric and/or electronic circuit so that a code significant of a magnetic card subsequently sensed in the card reader can be stored among a number of pre-stored codes,
- b) the second person identifies the first person and establishes the validity of a magnetic card in the possession of said first person, said magnetic card being intended for other main purposes than that of obtaining entrance to the confined space or area,
- c) the magnetic card belonging to said first person is inserted into the card reader which senses the code significant to the card,

- d) the significant code is therewith stored as an additional code among pre-stored codes, and in that
- e) subsequent sensing of the magnetic card in the card reader affords free access to the confined space or area.

2. A method according to Claim 1, characterized in that in order to obtain free access to the confined space or area, it is not sufficient solely for the sensed magnetic card to produce a code which is in agreement with a stored code, but that, in addition hereto, an identification code assigned to said person must also be inserted through a button bank.

3. A method according to Claim 1 or 2, characterized in that the second person activates the aforesaid means incorporated in the circuit, by inserting into the circuits, through a button bank, a code significant for writing in said code.

4. A method according to any of the preceding claims, characterized by providing a change-over clock for establishing those periods of time over which the method according to Claim 1 shall apply and those periods of time during which the method according to Claim 2 shall apply.

5. A method according to any of the preceding claims, characterized in that the signal for deactivating the circuit for latching the door, gate or like entrance is caused to occur for a limited time duration, for example a time duration of between one and thirty seconds.

6. A method according to Claim 2, characterized in that the identification code is formed by adding a conversion number to a group of digits in a numerical series significant to the magnetic card.

7. A method according to Claim 6, characterized in that the conversion factor comprises all or a part of an inhibition code.

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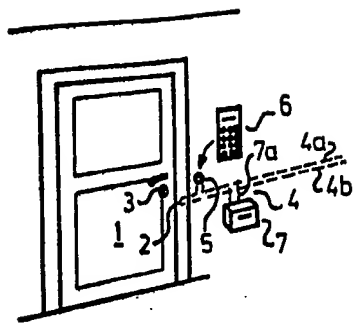


FIG. 1

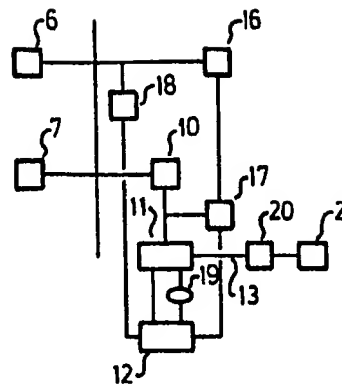


FIG. 2

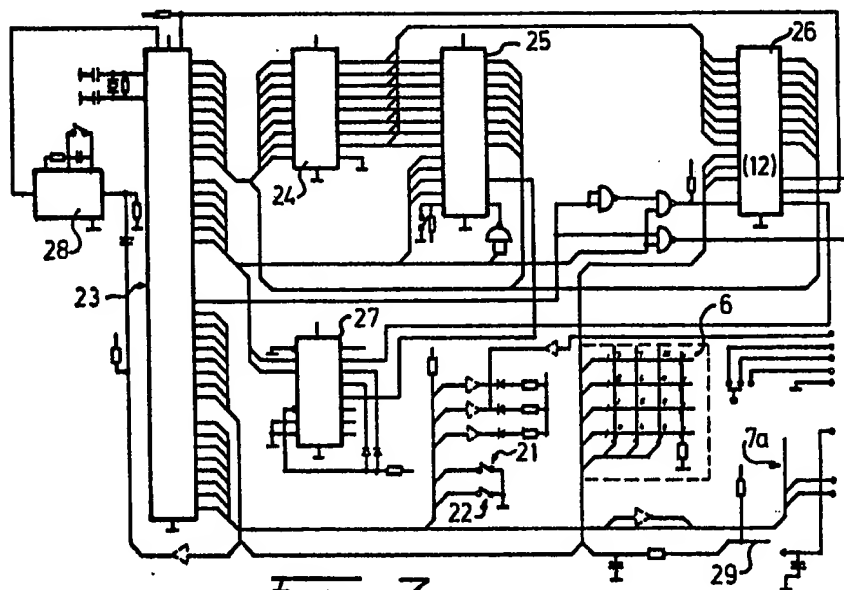


FIG. 3